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ABSTRACT

The TRANSCOM (Transportation Command) Regulating Command and Control Evacuation System (TRAC2ES), which applies state-of-the-art technology to manage global medical regulating (matching patients to clinical availability) and medical evacuation processes, will be installed at all Department of Defense medical locations globally. A combination of distance educational methodologies and traditional training will be used to help all staff members become proficient users of the TRAC2ES system. The training program will be designed to ensure that as many medical treatment facility staff as possible have a general understanding of the TRAC2ES system and patient affairs clerks are able to input patient and/or casualty information to initiate the process of regulating and evacuation. The training will ensure that trainees are able to use a computer, access the Internet, run the TRAC2ES system's medical planner, and access and use the system's patient-tracking site. Traditional classroom and laboratory instruction will be combined with the following distance education components: text and audio formats, videotapes, CD-ROM, online help, and videoteleconferencing. A central training facility will be established to produce the training materials, design the distance learning programs, and provide the interaction with students worldwide for initial and follow-up training. (MN)

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Distance Learning Methodologies

TRANSCOM Regulating and Command & Control Evacuation System (TRAC^{2}ES)

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The TRANSCOM Regulating and Command & Control Evacuation System (TRAC^{2}ES) applies state-of-the-art technology, both hardware and software, to manage global medical regulating (i.e., matching patients to clinical availability) and medical evacuation assets for efficient use of scarce resources. The system will be installed at all Department of Defense (DoD) medical locations globally. Distance education methodologies, along with traditional training, will provide the forum for staff members at all levels to become proficient users.

The United States Transportation Command headquartered at Scott AFB, Illinois, is responsible for medical regulating and casualty movement for the Department of Defense (DoD). With United States military forces employed globally, the system and processes for medical regulating and subsequently, casualty movement become detailed and complex. Medical regulating is the process of identifying an available clinical care capability, usually expressed as a "bed", for a casualty that has been requested to be moved. The regulating decision can be made to move a casualty from one point to another within a small geographical area, or, theater of operations, or it can be made to move the casualty from an originating point across the boundaries of the theater of operations through US geographical commands to a medical facility in the United States. The casualty movement command and control system involves provision for ensuring the patient is properly prepared for movement, can be transported by the appropriate vehicle (ambulance, truck, bus, plane, ship, rail), and has sufficient supplies to make the trip. This system also involves the assignment of medical personnel to provide enroute care in whatever vehicle is used and to hand the casualty over to the destination medical staff in the same or better medical condition with updated medical information provided.

Following the war with Iran (Operation DESERT SHIELD and Operation DESERT STORM) in 1991, system managers realized the medical regulating process and the casualty evacuation command and control system used were dichotomous, cumbersome, and required significant change. Further, the current system did not provide the

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information required both within the military hierarchy and by the Executive Branch, Congress, and the American Public. An improved system using state-of-the-art technology was required. It was determined via a series of reengineering studies by groups of experienced managers, the process of medical regulating and the command and control direction of casualty evacuation could be combined in a single integrated system. This would allow customers to make one request for obtaining a movement destination to the appropriate clinical care environment. This request would be aggregated with all other requests into a planning algorithm. The resulting answer would provide both the destination for the casualty and information regarding the transportation scheduling to move the casualty for point of origination to final destination. Enroute stops would be accommodated in the scheduling algorithm.

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Clinical care requirements as defined by the originating medical facility and validated by clinical movement authorities would be specified. Documentation of the movement process and the clinical care provided enroute would be captured. The "system" would be afforded real-time information of who and where each casualty was. This system would be linked to other Department of Defense automated information management systems to provide cross-feed between and among the systems. By doing so, intransit patient visibility (ITV) would be achieved, both medical and personnel systems would be current and accurate. Additional modules designed into the process would be able to track medical equipment and patient movement items (stretchers, bedding, pillows, ventilators, etc.) as scarce resources. By tracking these items, the management of logistics to support the medical evacuation system would have better flexibility and support.

The reengineering process started in the fall of 1992. As expert groups decomposed the current systems to determine the critical elements, they then proposed a vision, what the future should be in terms of an automated system. As these actions were taken, a team of military experts, familiar with medical regulating and evacuation procedures, and supported by civilian experts in modeling defined critical elements of the new vision. Once these critical elements were defined, the process of constructing the new system started. Each element was reconstructed to be a part of the new system. And since the new system was to be automated, software designers supported by subject matter experts were employed to build the software necessary to create the decision and planning algorithms required for the new system. Throughout this tedious process, further consideration was given to concept and philosophy and thinking through the

changes required in doctrine and policy.

As this reengineering effort continued, it became necessary to develop a name for the system. The name became the "TRANSCOM Regulating and Command & Control Evacuation System" or TRAC^{2}ES (for the ever present military acronym). The United States Transportation Command is the responsible authority. The system will integrate the regulating and evacuation processes. And it will provide, in conjunction with movement operations centers (ground, sea or air) an integrated command and control structure.

Implementing TRAC^{2}ES

As the system matures into a prototype and then into formal use, it will be implemented/installed throughout DoD globally. As in any information system, the requirement is to establish a communication connection between and among the individual units. As technology and communication have advanced during the development of this program, it became apparent the communication backbone should be the Internet as opposed to an independent relatively expensive unique communication setup. Thus, the Internet will provide the communication connectivity. Casualties will be reported from the MTF via an Internet connection with dial-up modem used as a backup. As the information is processed and needs to be passed back to the MTF staff to manage the casualty evacuation process, email will provide the information connection.

The Training Requirement Support Plan

As progress continued on the software development and prototype manufacture started, a training program was initiated. Starting in early 1996, a front-end analysis (FEA) was conducted by contractor training analysts. The FEA was conducted in cooperation with subject matter experts, users, and the Training Cell Lead. The analysis involved reviewing existing TRAC^{2}ES documentation, DoD policies, and service specific directives to ensure consistency, currency, and relevance of training materials. It addressed learner requirements by task and skill level required. It identified critical tasks, skills, knowledge, and ability to perform job related requirements. Additionally, the FEA included the resource requirements to conduct training at various locations and a contingency plan for training personnel "on the job" to support contingency requirements. Once this framework was designed, the courseware for training was developed.

In April 1997, a training support plan was published. The purpose of the training

support plan is to provide guidance, instruction, and milestones for the development, implementation, and management of a training program to accompany the installation of TRAC^{2}ES into medical treatment facilities (MTFs) and patient movement requirement centers to support USTRANSCOM's global patient movement system. Specifically, this plan provides guidance for planning and development of training to ensure that all resources and supporting actions required for establishment and support of the TRAC ^{2}ES training program are considered. (TRAC^{2}ES Training Support Plan, 7 April 1997)

The plan provided the following goals and delineated the strategies to establish the basis for training requirements.

> Goal 1: Provide an environment within which the full range of TRAC^{2}ES users, from novice to expert, can function on the job.
>
> Goal 2: Enable novices to perform as experts.
>
> Goal 3: Reduce reliance on trial and error as the basis for on-the-job learning.
>
> Goal 4: Provide interactive, flexible communications and on-the-job training on new processes, system capabilities, and products.

The Training Requirement – Organizations

To set the stage and to emphasize the magnitude of the training requirement, further explanation is required. The system will be implemented in medical treatment facilities (MTF), in intermediate headquarters joint patient movement centers, in headquarters patient movement centers, and will be accessible from a number of lateral headquarters and unified command offices.

Within the medical treatment facilities, two training activities will be required. The first is a general overview of the system to as many of the MTF staff as possible. The second training effort would be directed at the relatively few individuals (patient affairs clerks) who would input patient (casualty) information to initiate the process of regulating and evacuation. Since there several hundred such facilities in DoD, geographically wide spread, providing the right training process becomes critical. And, of course, the requirement certainly lends itself to distance learning processes.

At the intermediate headquarters and/or headquarter locations, there are organizations titled "patient movement requirements centers" (PMRC). These could be theater wide

as in a Theater Patient Movement Requirements Center (TPMRC) or for a local area of operations as in a Joint Patient Movement Requirements Center (JPMRC). At these locations the training requirement would be from 15 – 100 individuals each.

There will also be an umbrella organization called the Global Patient Movement Requirements Center which will have approximately 65 people assigned, all of whom will be required to intimately familiar with the system.

In addition to those elements, several people at a number of offices in higher headquarters, service department medical staffs and at the Joint Chiefs of Staff will require training to be able to access the system for general information and to track casualties when requests for specific individuals are made.

And because the majority of DoD medical staff is in the Guard and/or Reserve structure, the training process must be extended to those members. Just-in-time training and real time training will be required. Because of geographical separation and because guardspersons and reservists have very limited time to train when on annual tour, the provision of distance learning will be of significance in their training environment.

Training – What Is Needed?

Training may include the most basic requirements and then proceed to the detailed information required to perform the job with new software. We sometimes forget that our students may never have used a computer before; basic computer familiarization and use may be part of the training equation. Standard computer use programs will be required to part of the complete training system. Once a basic skill level for computer use is achieved, the student them must be trained to access the Internet with the browser of choice.

Once the Internet connection is achieved, the menus necessary for working the system are accessed through the web pages at the server level. At the medical treatment facility level, the user then provides the information required by the menu. Pulldown support files allow click and drag or copy input for standard items. Medical conditions/diagnosis are pulled from a standard file, which provides all the ICD-9 medical codes used.

At the Patient Movement Requirement Center level, each user will be trained to run the medical planner, the computer algorithm that aggregates the casualty request with all other information and provides the planner result. Once validated this result in the form of a patient manifest and the casualty evacuation itinerary and mission flow sheets is produced and fed back to the MTF by email. Training for these users will be detailed.

In addition to the aforementioned training requirements, the system will include a Patient Tracking Site, a web page on the Internet when all members who have access

can enter and see the status of any patient in the data base. This element will require a basic training need for a large number of people.

Training Support

Training will be accomplished using traditional methods as well as an evolution to distance learning processes as the system is implemented and matures. Traditional methods include one-on-one instruction (to include on-the-job training) to classroom/laboratories instruction. Familiarization training, not necessarily to teach user applications, but to provide large group introduction to the paradigm shift will be conducted conference room/auditorium settings. Within two years, distance learning will become the standard training application.

One on one instruction may be required for specific situations. Initial implementation of the system posits two-person training teams traveling to each MTF for the installation/training process. This relatively expensive method of training is considered necessary because it also supports the installation and implementation of a new system. Installation requires either providing the right computer equipment or in most cases, ensuring appropriate equipment is available and the right Internet browser is loaded. Although the new system will allow better flexibility and ease of doing business, the process of working through change must be accommodated. Once the initial cadre is proficient, they will be expected to pass on basic knowledge and skills to new staff members.

Classroom instruction is a less expensive method of providing training for a number of people. Because of the technology involved and the requirement to have hands on training, the number of users who can be trained in any single session is limited by the number of terminals available and, of course, the span of control for the instructor. Generally, eight to ten terminals set in an intranet environment are considered the right classroom/laboratory size. This process of training can be used for training the user, but is more efficient when used to "train the trainers".

In this latter situation, the people trained would then be responsible to return to their home station and provide indoctrination and/or training to other staff members. They would do so by general briefings using training materials developed and provided by the TRAC^{2}ES training staff. They would also provide on-the-job specific training to their peers and to new staff members. The use of these trainers is viewed as critical for the patient movement control centers where the entire staff must be totally familiar with the entire spectrum of the TRAC^{2}ES technology and system workings. In addition, because of duty requirements, not all members will be able to attend classes outside the job, therefore, bringing the trainer into the work environment becomes a necessity. The use of interactive training devices and on-line tutors will also facilitate having each member

fully trained.

The courseware developed would also be added to basic training schools for members coming into the service in that skill area. This would further the proliferation of a minimal understanding of TRAC^{2}ES throughout the DoD medical structure.

As implementation occurs and the system matures over a one to two year period, the training processes will transition from one of minimal classroom encounters to a training system using distance learning processes. Rigorous training of current staffs and indoctrination of new members will have accommodated the process of change.

Distance Learning Applications

The gamut of possibilities for distance learning applications include text, audio formats, videotapes, CD ROM, and on-line help features. The technologies for videoteleconferencing combine the video/audio/interactive processes to provide an effective tool for distance learning. An on-line tutor program will certainly be necessary. A central training facility wwill be established to produce the training materials, design the distance learning programs, and provide the interaction with students world-wide for initial and follow-on training. The Internet would provide the basis for global interactive training, concomitant with other modalities, such as videoteleconferencing, and interactive CD Rom.

Back to Basics

Having developed this paper to this point, it is necessary to reflect on the basics of distance education. An internet search turned up several sources of information. A series of guides – Distance Education at a Glance - is available from the University of Idaho Engineering Outreach Staff (http://www.uidaho.edu/evo/). The following information was extracted from a University of Pennsylvania Task Force Report on Distance Education. (Nov 92) http://www.ced.psu.edu/de/de_tf.html)

"Distance education, like any formal method of educating, is a means by which someone who desires to learn engages in some form of communication with someone who can educate.... However, distance education differs from most other forms of education in that the learner and the teacher are geographically remote from one another. Although distance education may be defined in a number of ways, this task force has viewed "distance education" as a very specific term that applies only to situations involving geographical separation, a teacher, a learner or learners, interactive communication, and the acquisition of knowledge, skills, and understanding. Although both distance teaching and distance learning do take place, there is also the demand that some form of interaction exists between the teacher and learner...."

Having posed interaction as the key, the Report further specifies that certain activities, i.e., "programmed texts, and/or instructional TV broadcasts, audio or taped lessons and computer learning programs, would not be considered as forms of distance education." "However, any or all of these may be part of a distance learning system if they are joined to some form of two-way communication that allows for interaction between the teacher and the learner. Two-way communication may be established using a wide variety of media including computer communications, telephone, and postal service. Emerging technologies like interactive multi-media and fiber-optic networks are already expanding the interactive capabilities of distance education and promise to yield even greater capacity in the future."

"... One of the great misconceptions of distance education is that success and accomplishment in face-to-face teaching can simply be proliferated through video broadcast or tape distribution..." This approach will often lead to a less than positive result. "However, well-designed and well-managed distance education programs produce learning outcomes equal to those of face-to-face instruction."

"A second misconception of distance education is that it is inherently inferior to face-to-face instruction or, correspondingly, that face-to-face instruction is inherently better or more successful in producing quality learning than is distance education. Again, to the contrary, research indicates that well-designed distance education programs produce learning outcomes that are equitable with the face-to-face model."

This report goes on to discuss the factors that make distance learning processes of significant value. These include:

- The most obvious benefit of distance education is that it can provide access and opportunity for learners who cannot obtain education due to geographic or physical isolation/ The evolving nature of distance education ... can offer "enhanced quality, increased efficiency, and greater effectiveness..."
- "The most advanced distance education programs can provide students with far greater involvement in the process of learning..." Students can shape and design the learning environment to suit their own particular circumstances and self-direct instruction to serve their individual needs and abilities. They can "set the pace of their learning and improve their comprehension and skill..., the constraints of time and place can be the student chooses."
- "Interactive computer-based programs can provide students with a far greater interaction" than they may experience in a classroom environment.
- "The emerging technologies of distance education also provide extraordinary opportunity to enhance learning benefits through increased efficiency in the delivery of quality instruction to the broadest possible audience of learners. Quality teachers, our greatest educational asset, are in far too short a supply."
- "The technologies of distance education can ... expand learning opportunities ... by providing instructional materials that cover the breadth and depth of a particular subject ... allowing students to self-direct their learning to individualized levels of experience. Motion, sound, image, and the interplay of a wide variety of media can combine with traditional text to make learning a more interesting and challenging position for the student..."
- And Geoffrey R. Amthor states, "There is general agreement among researchers that people retain about 20 percent of what they hear, 40 percent of what they see and hear, and 75 percent of what they see, hear, and do. Interactive multimedia is the tool most appropriate to arriving at that 75 percent retention in formal education." Geoffrey R. Amthor, *Multimedia In Education: An Introduction*

The report concludes with, "We believe that distance education must become a component, albeit a most important component, that needs to be added to the complex matrix of means that must be employed if we are to meet the demands of the future. Distance education is a tool, a most valuable tool, and one that needs to be used to far greater effect and profit than it has been in the past."

Summary

The United States Transportation Command, responsible for a significant mission within the Department of Defense, has embarked on a multi-year effort to create a paradigm shift. Reengineering the historical process has resulted in the creation of a new paradigm. As it is implemented, training is a critical element.

A Training Program Management and Support Plan has been drafted as has a Training Support Plan for the prototype system. While training will start with traditional methods, the use of distance learning processes will all be employed. As the system matures, distance learning will become the primary method of continuation training.

As point. out in the Back to Basic segment, a carefully developed distance learning program, employing the proper techniques and using available technology will provide effectively trained users. The key to effective distance learning is to provide an interactive environment where the student can seek and find help and advice.

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"Multimedia In Education: An Introduction," Geoffrey R. Amthor. Author General Knowledge. The Author has been associated with this program since its inception in 1992, both in a military capacity, and subsequently, in a contractor role.

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